Service Manual

STAR T3/T3R UPS
6kVA~10kVA 220VAC

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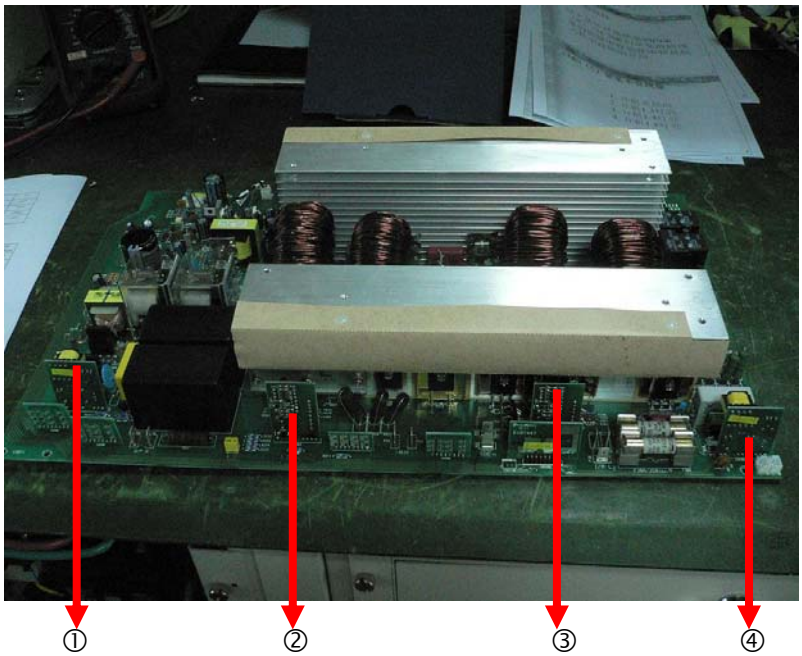
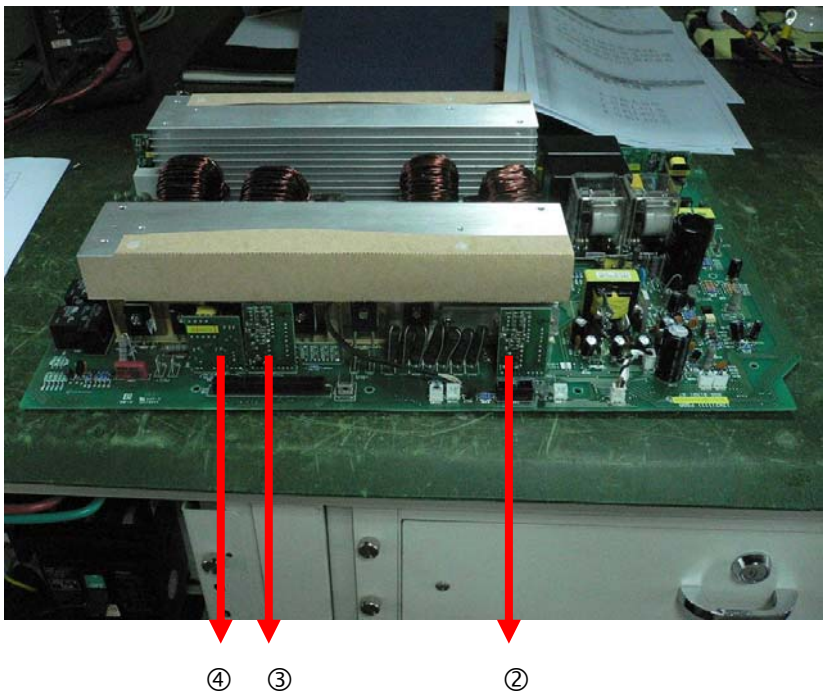
1. PSDR Introduction

1.1 6/10 kVA PSDR-Right side



1.2 6/10 kVA PSDR-Left side



1. Bypass Mosfet Driver
2. Inverter IGBT Driver Module
3. Boost IGBT Driver Module
4. PFC IGBT Driver Module

2. Fault and Warning

LCD & LED Status / Audible Alarms	Possible Cause	Action
AC: OK BATT: OK TEMP Fail Fault Warning Normal • UPS in Bypass Mode. • The alarm beeps continuously.	1. Fan fail. 2. Temperature is higher than allowed operation temperature.	1. Replace the fan. 2. Reduce ambient temperature or O/P load.
AC: OK BATT: OK Inverter Fail Fault Warning Normal • UPS in Bypass Mode. • Fault LED lights up and the alarm beeps continuously.	1. Inverter circuit failed. 2. Inverter driver failed. 3. PFC circuit failed.	1. Replace the Inverter components or driver. 2. Replace the PFC components or driver.
AC: OK BATT: LOW Normal Mode Fault Warning Normal • UPS in Normal Mode, but battery capacity is low. • The alarm beeps once every second for battery low.	1. Charger may break down.	1. Please replace charger board.
AC: OK BATT: OK DC_BUS Fail Fault Warning Normal • UPS stop working. • The alarm beeps continuously.	1. Boost circuit failed. 2. Inverter circuit failed 3. PFC circuit failed 4. BUS circuit failed.	1. Replace the Boost components. 2. Replace the Inverter components. 3. Replace the PFC components. 4. Replace the BUS circuit components.

3. Troubleshooting

3.1 Quick Start

For the 6 and 10kVA, both of the boards are the same size, only the some power components of 10kVA should be more than 6kVA.

Before any check of UPS, please check the components as listed in the following table. This action could help you find problem quickly and make sure these components good or not first.

Possible Circuit Block	Coded Components	Description	Failure Mode
BAT FUSE	F303/F304	Fuse	Open
I/P FUSE (on PSDR)	F301/F302	Fuse	Open
PFC Correction	Q301, Q302	MOSFET	A-K Short or open
Push-Pull Boost	Q306, Q307,Q308, Q309, Q310, Q311	IGBT	D-S short or open
	D302, D304, D306, D303, D305, D307	Power Diode	Short or open
	D309, D311, D308, D310		
Inverter	Q201, Q202, Q203, Q204	IGBT	C-E short or open
	D201, D202, D203, D204, D205	Power Diode	Short or open
	D210, D211, D212, D213		
Charger module(standard)	Q907, Q908	IGBT	D-S short or open
	D901,D902,D903	Power Diode	Short or open
	Q909	MOSFET	A-K Short or open
IP SCR module	Q3, Q4, Q5, Q6	MOSFET	A-K short or open

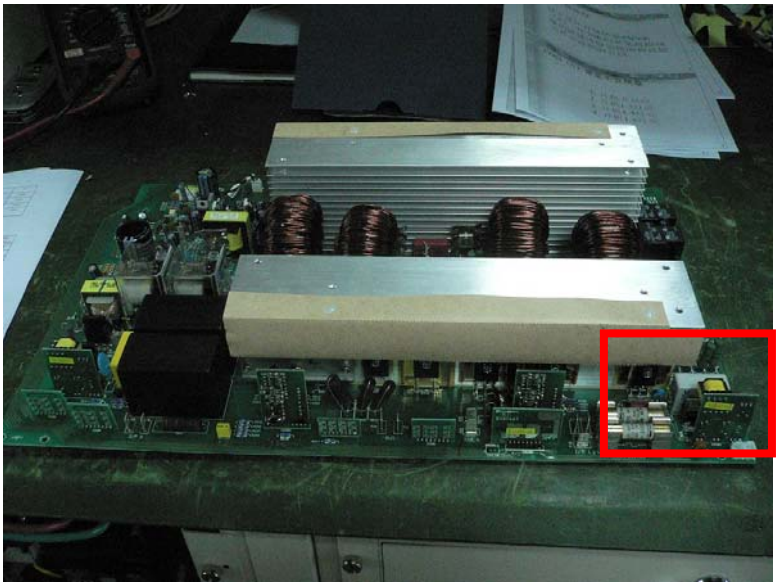
If the fuse is open, replacing fuse only, **DO NOT** mean you have solved the problem. General speaking, fuse open was caused by other failure of components; therefore, you must find the real defective components and replace them, before restart the UPS.

3. Troubleshooting

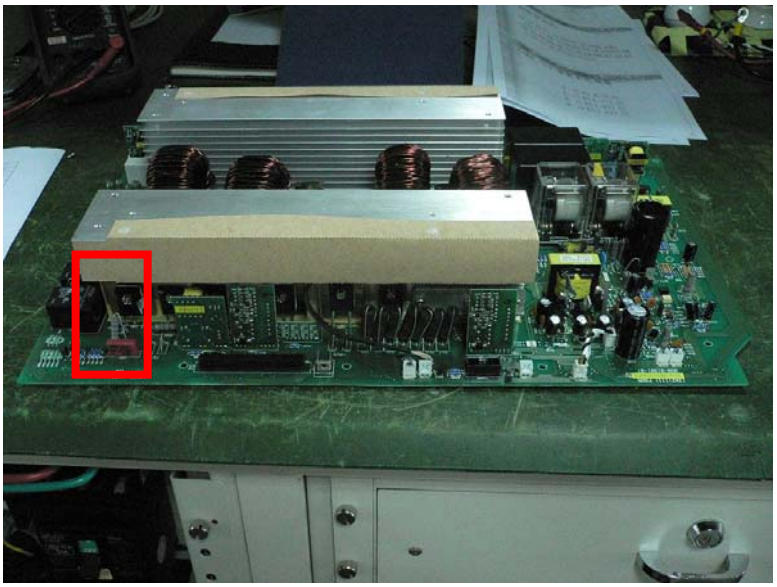
3.2 PFC Analysis:

In this section, some components you could check to see if failure occurs on PFC Correction circuit as shown below. Be aware of F301, F302 fuse open indicates failure of this block. Please replace all faulty components before re-start the UPS.

6/10kVA-PFC-Right side



6/10kVA-PFC-Left side



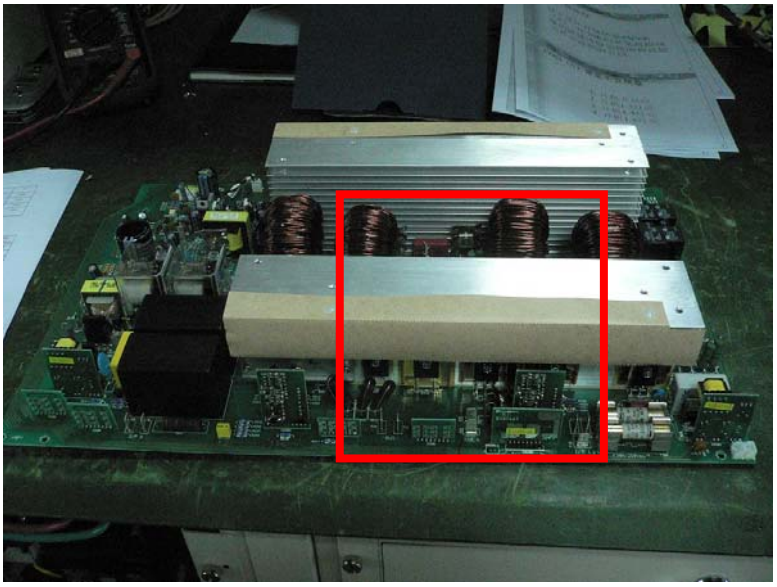
Step	Checked components		Instrument function	Reference Value	Failure Mode
1	F301, F302		Ω	0 Ω	Open
2	Q301	(A, K)	Ω	2.6 MΩ	Short or open
	Q302	(G, K)	Ω	10 Ω	Short or open

Action Item: If all above-stated components are replaced well and UPS still can't work, change the PFC IGBT driver module.

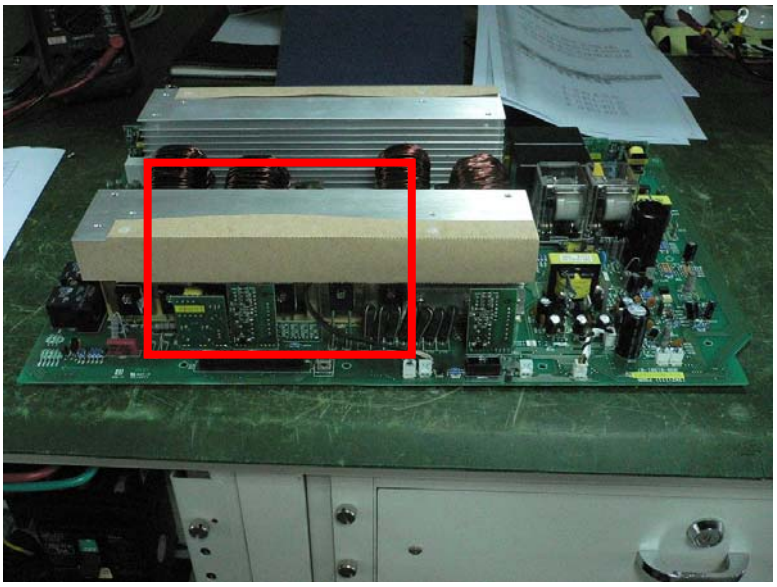
3. Troubleshooting

3.3 Boost Analysis

6/10kVA-Boost-Right side



6/10kVA-Boost-Left side



Step	Checked components		Instrument function	Reference Value	Failure Mode
1	Q306~Q311	(E,C)	Ω	800kΩ	short
		(G,E)	Ω	15.8kΩ	short or open
2	D308, D310, D309, D311		DIODE	0.35V	0 V
3	D302, D304, D306, D303, D305, D307		DIODE	12Ω	open

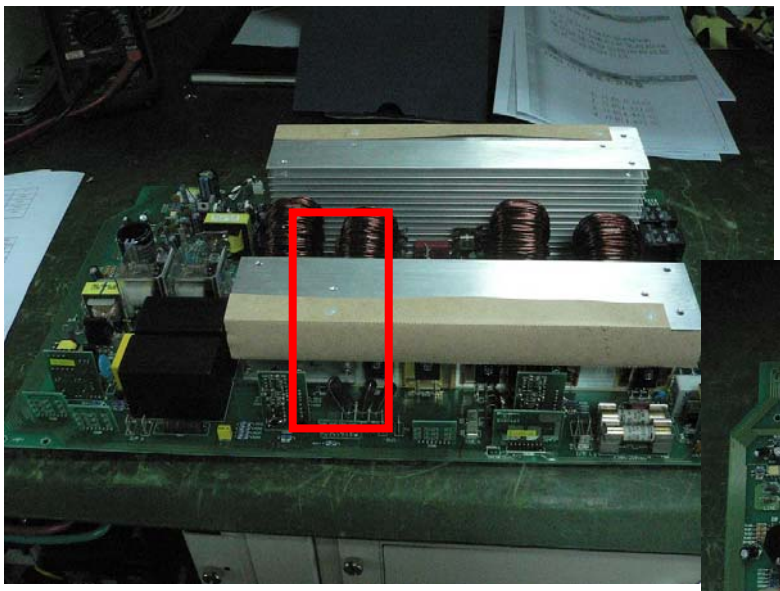
4	R325, R331, R334, R342, R337, R328		Ω	10Ω	open
5	R390, R388, R389, R393, R392, R391		Ω	2.2Ω	open
6	F303, F304		Ω	0Ω	open
7	Q305	(A,K)	Ω	2.5MΩ	short
		(G,K)	Ω	10Ω	short

Action Item: If all above-stated components are replaced well and UPS still can't be DC start, change Boost IGBT Driver Module.

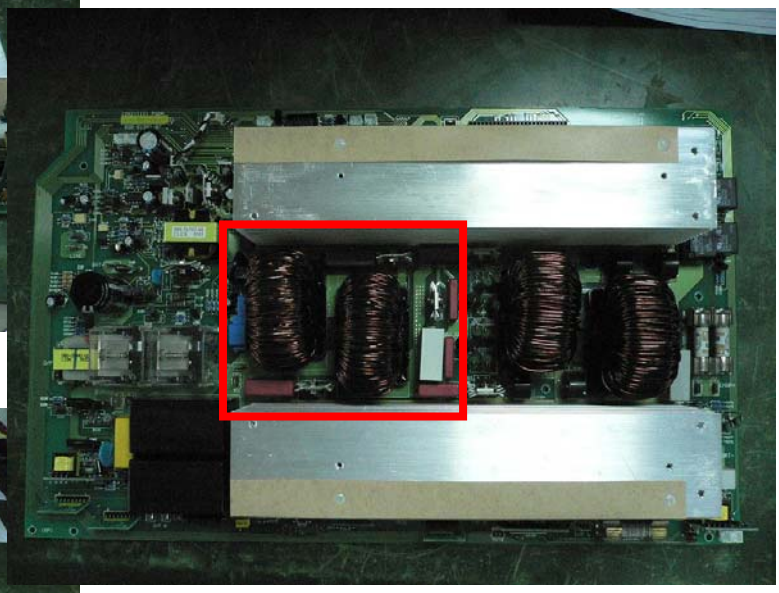
3. Troubleshooting

3.4 Inverter Analysis

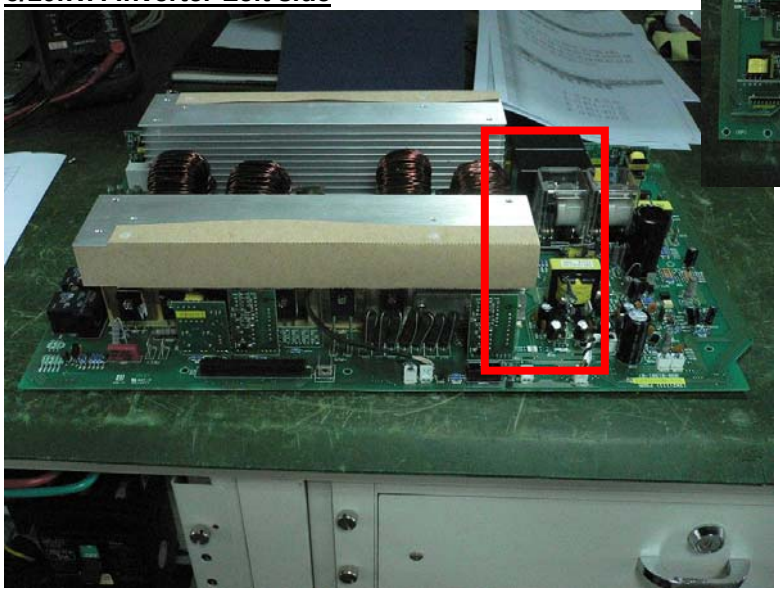
6/10kVA-Inverter-Right side



6/10kVA-Inverter-Middle side



6/10kVA-Inverter-Left side



Step	Checked components		Instrument function	Reference Value	Failure Mode
1	Q201,Q202, Q203,Q204	(E,C)	Ω	100kΩ	Short
		(G,E)	Ω	23.5kΩ	Short or Open
2	D201,D202,D203,D204,D205		Diode	0.36V	0V
3	D210,D211,D212,D213		Diode	46Ω	Open
4	R201,R202,R208,R209		Ω	10Ω	Open
5	R203,R204,R210,R211		Ω	36Ω	Open

Action Item: Make sure the DC fuses with same rating as original ones for replacement. Otherwise, unpredictable danger might happen.

3. Troubleshooting

3.5 Charger Module Analysis

6/10 kVA-Charger Module- Long back-up type

Step	Checked components	Instrument function	Reference Value	Failure Mode
1	F1	Ω	0Ω	open
2	Q301 Q105	(E,C)	Ω	≈1MΩ
		(G,E)	Ω	10kΩ
3	D303	DIODE	≈0.4V	0V
4	R315	Ω	10Ω	open
5	R319	Ω	1kΩ	open
6	D106	DIODE	≈0.4V	0V
7	R112,R159	Ω	10Ω	open
8	Q04	(A,K)	Ω	≈1MΩ
		(G,K)	Ω	≈12Ω
9	R320,R321,R322,R340,R339, R341	Ω	≈0.5/6 Ω	open

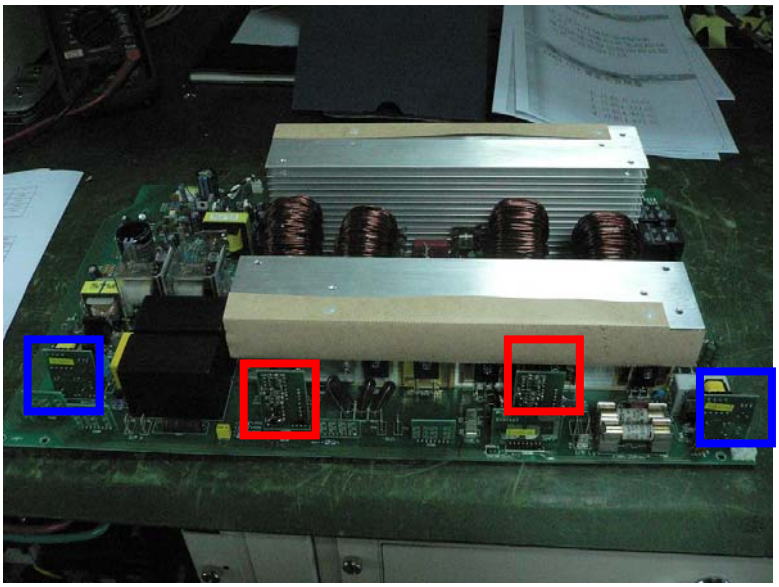
6/10 kVA- Charger Module- Standard type

Step	Checked components	Instrument function	Reference Value	Failure Mode
1	F901,F902,F903, F904,F905,F906,	Ω	0Ω	open
2	Q907,Q908,	(S, D)	Ω	≈1.7MΩ
		(G, S)	Ω	32Ω
3	D901,D902, D903	**DIODE**	≈0.4V	0V
4	Q909	(A, K)	Ω	≈20MΩ
		(G, K)	Ω	≈42Ω

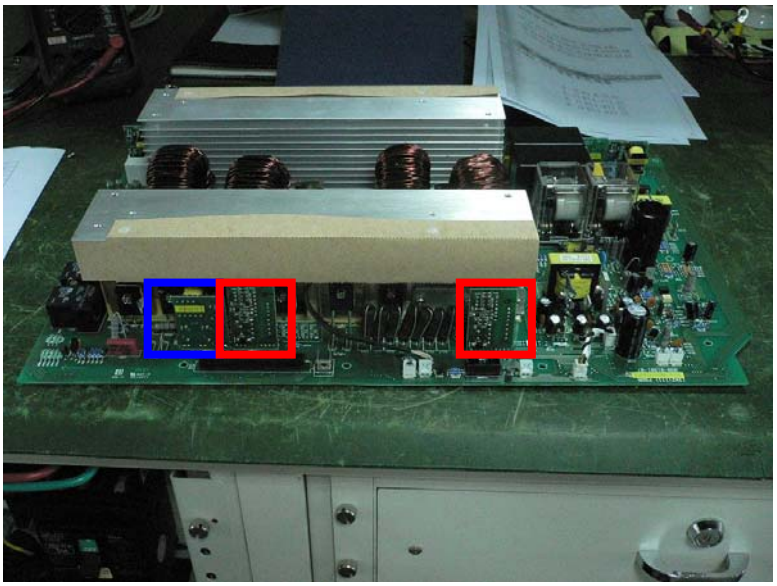
3. Troubleshooting

3.6 PFC / Boost / Inverter IGBT Driver Module Analysis

6/10kVA-Boost-Right side



6/10kVA-Boost-Left side

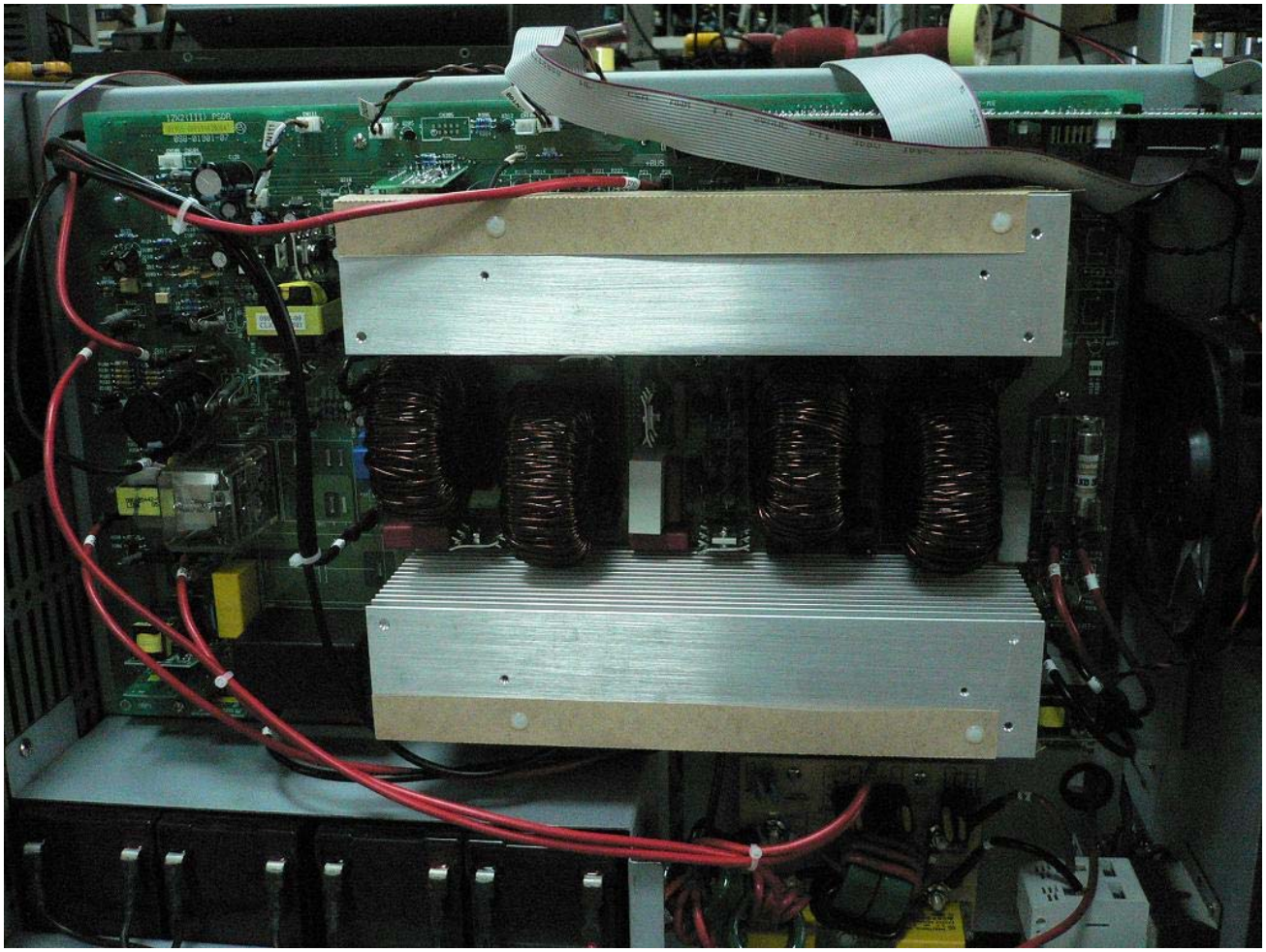


Step	Checked components	Instrument function	Reference Value	Failure Mode
1(RED)	ZD201	V	0.7V	0V
	Q201,Q202	V	V_{BE}=0625V, V_{BC}=0.625V	0V
	R203,R205	Ω	10Ω	Open
2(BLUE)	D201	V	0.580V	0V
	Q01	V	V_{SD}=0.5V V_{SG}=2.225V	0V

4. Final testing

After you have replaced all defective components on power stage (PSDR), please follow the steps as below.

Step 1. Install the PSDR board into UPS unit, but **DO NOT** connect with “Battery” and “Input source”.



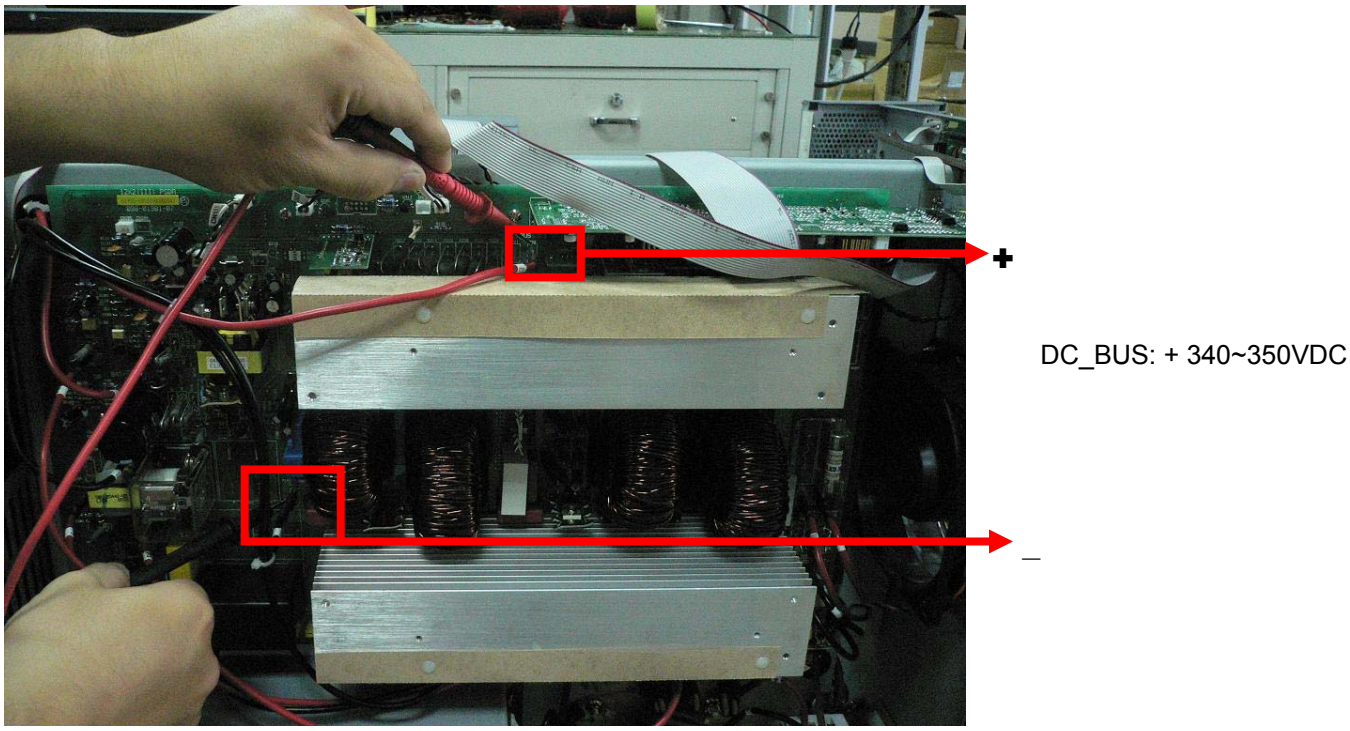
- Before go to step 2, make sure all of the cable should be connected the right position.
- Do not connect with AC power source yet.

Step 2. Supply DC voltage (**270**Vdc/3 Amp (limited current) for 6/10kVA) with DC power supply via BAT(+) and BAT(-). Press the switch on front panel for more than 3 seconds, you will see "current limit" **for a short time** on the DC power supply for about only 2 seconds, then UPS should be DC start (If UPS does not start successfully, and **LCD display off, replace the above procedure).** If UPS fails to start up for several times or DC power supply is on current-limit state continuously, there must be some defective components exist. Please follow the section 3 trouble shooting to check again.

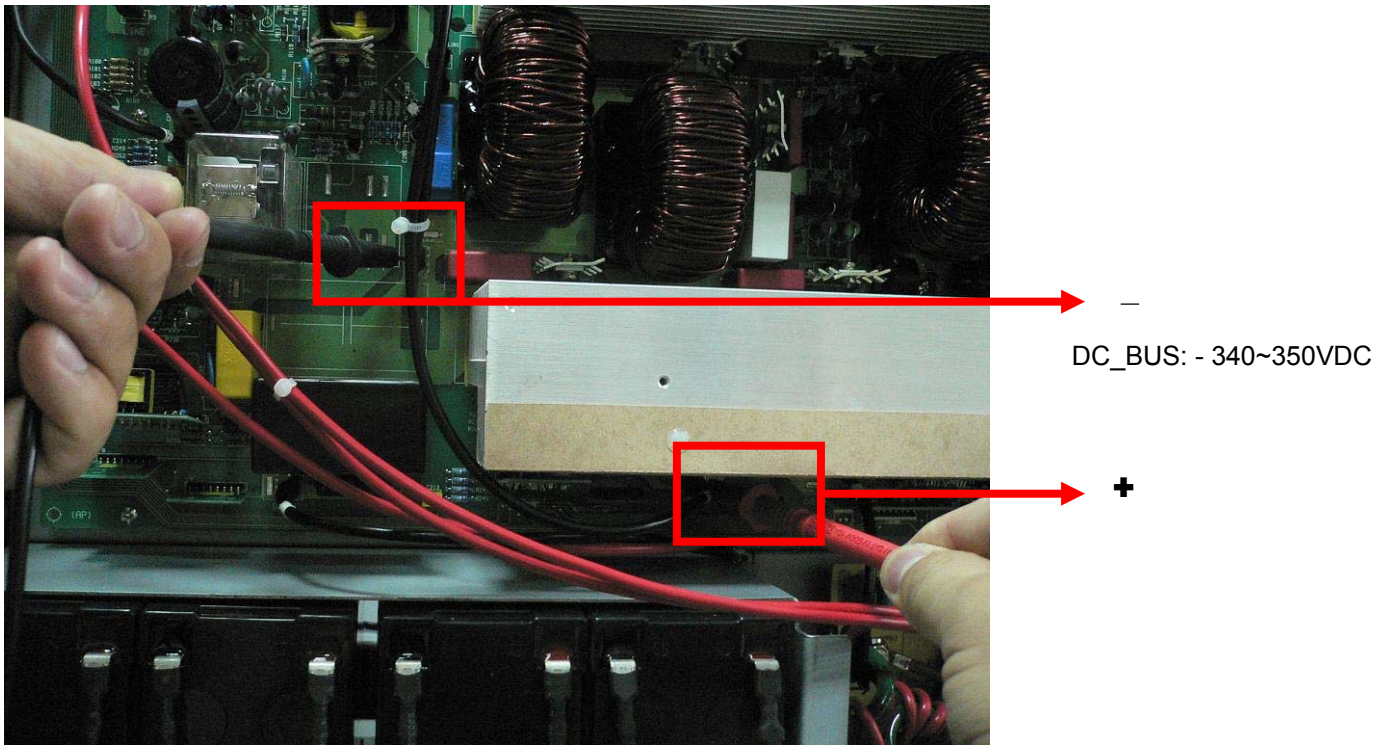
4. Final testing

Step 3. If the UPS re-start normally, check the DC_BUS and output voltage.
- For 6/10kVA, DC_BUS: +340~350 and -340~350VDC, deviation between negative and positive voltage should be within 10VDC. Output Voltage: 220/230/240 +/-2%

DC-BUS Voltage: Positive

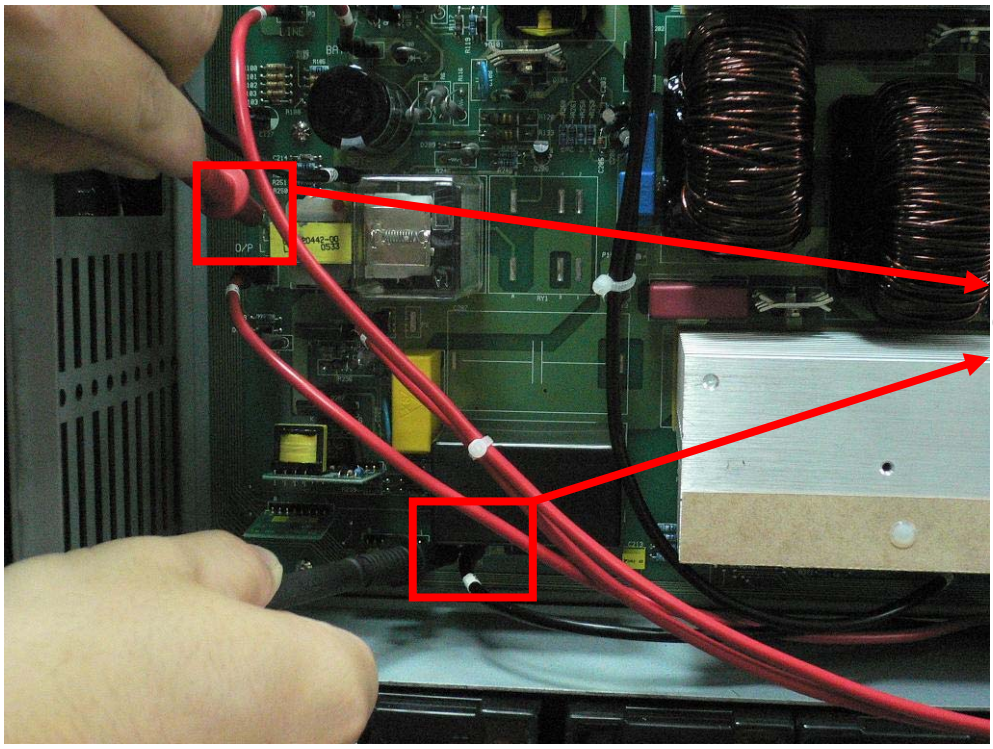


DC-BUS Voltage: Negative



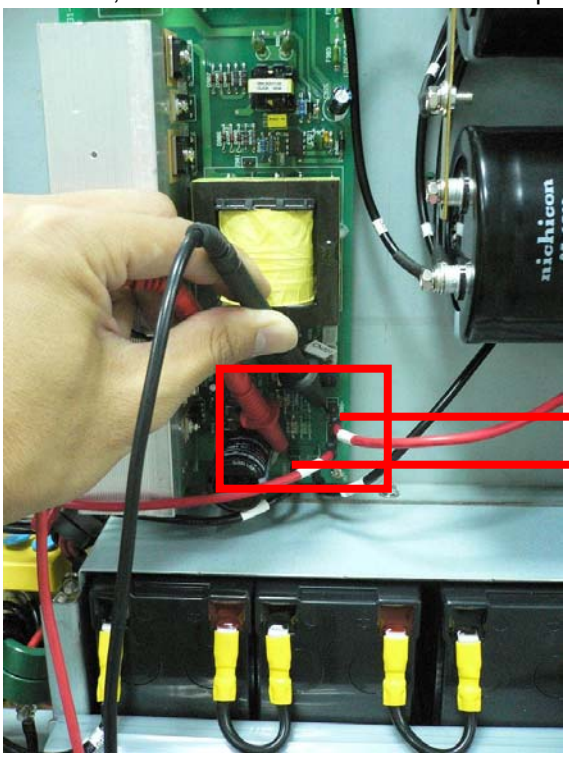
4. Final testing

Output Voltage



Output Voltage: 220/230/240 +/-2%

Step 5. Connect with AC power source, then follow the step3 and step4 to check the DC_BUS and output voltage again. Also, the charger voltage need to be confirmed, the charger voltage should be 274VDC +/-1%. If UPS fails to start up for several times, there must be some defective components exist. Please follow section 3 trouble shooting to check again.



– Charger Voltage: 274VDC +/-1%

+